

13. The amphidises gradually penetrate into the layer of the clavate cells, and distribute themselves between them.

14. The cells which are displaced by the amphidises emerge upon the surface of the latter, and secrete the second chitinous cuticle, whereupon they atrophy, and the gemmule appears in its completely developed state, as previously described by Gøtte and Wierzejski.

Finally one little remark in conclusion: Gøtte's assertion that the clavate cells of the gemmule in process of formation form amphidises in their interior, appears to me to be at once improbable, for the very reason that in such a case we would have to ascribe a double rôle to one and the same cell; *i. e.* the faculty of secreting (1) chitin with their lower flattened end, and that, too, twice over; and (2) silica for the formation of the amphidises. So far as I am able to judge, there is no instance of the assumption by one and the same cell of such different chemical functions.—*Zoologischer Anzeiger*, xv. Jahrg., No. 386, March 14, 1892, pp. 95-96 (sent in Dec. 14, 1891).

*On the Habits of Gelasimus annulipes, Edw.*

By A. ALCOCK, M.B.

Darwin, in the 'Descent of Man,' quotes several observations which illustrate the considerable complexity of life of *Gelasimus*. He refers (2nd edition, pp. 254, 269, and 271) to Fritz Müller's account of Brazilian species of the genus in which the males are more numerous than the females, in which the pugnacity of the males is remarkable, and in which the male exhibits a chameleon-like attractiveness of colour not possessed by the female. He also refers to Milne-Edwards's quotation (*Hist. Nat. des Crustacés*, tom. ii. p. 50), that the male and female of a species of *Gelasimus* live together in one burrow, the mouth of which the male closes with his enormous chela.

The observations which I have to record are on the common species *Gelasimus annulipes*, Edw.

This species lives in vast swarms in "warrens" on the muddy tidal swamps of the Godáviri and Kistna, each individual having its own burrow, round which it ranges, and into which it retreats when alarmed.

In the colder months, at any rate, the males far outnumber the females.

In the male alone one of the chelæ is enormously developed. In a fully adult male the length of the large chela is two-and-a-half times the greatest length, and one-and-a-half times the greatest breadth, of the whole body, and 40 per cent. of the entire weight of the animal, and is coloured a beautiful cherry-red fading to a rose-pink,

the rest of the animal being of a dingy greenish-brown colour. I have been able to observe that, whatever other functions the great chela may serve—whether as a stopper to the mouth of the burrow, or as a nuptial support, as some have supposed—it also, in the species under consideration, is (i) a club used in the contests of rival males, and (ii) a signal to charm and allure the females. This last function is particularly apparent. As one walks across the mud one first becomes aware of the presence of these crabs by noticing that the surface of the mud is everywhere alive with twinkling objects of a brilliant pearly pink colour. Carefully watched, these prove to be the enormous chelæ of a crowd of males of *Gelasimus*, waving in the air, each little crab standing at the mouth of its burrow and ceaselessly brandishing its big claw. On closer observation, among every ten or so males a small clawless female may be seen feeding in apparent unconcern. If the female should approach the burrow of a male, the latter displays the greatest excitement, raising itself on its hindmost legs, dancing and stamping, and frantically waving its beautifully coloured big claw. From prolonged watching I feel convinced that the waving of the claw by the male is a signal of entreaty to the female, and I think that no one can doubt that the claw of the male has become conspicuous and beautiful in order to attract and charm the female.

The second function, as a fighting weapon, becomes apparent when in the general tournament one of the rival males approaches too close to another.

The great claw is then used as a club, the little creatures making savage back-handed sweeps at each other. When two males were put into a bucket together the larger immediately gave chase to the smaller, and with one blow swept him off his feet. I did not actually see the rival males seize each other in the conflict, but I have no doubt that they do so, for on going over the field of action I saw several freshly dismembered chelæ lying on the mud. So that the chela is probably used as a shears as well as a club.

It seems likely that the claw primarily became enlarged as a fighting weapon: but this, though it explains its size and weight, is not sufficient to account for its wonderfully conspicuous beauty, which, of itself, must make the little animal, otherwise sombrely coloured in harmony with its habitat, a mark to its enemies.

We can only suppose that the colour and brilliance has been secondarily acquired in order to attract and please the female.—From the *Administration Report of the Marine Survey of India* for 1891–92.